The Annals of Clinical and Analytical Medicine
Original Research

E-learning: a tool for teaching, marking a new era in pathology
A study among the students in NBU, KSA

Anshoo Agarwal, Syed Sajid Hussain Shah
College of Medicine Northern Border University, Arar, Kingdom of Saudi Arabia

This work was funded by the Deanship of Scientific Research, Northern Border University – Arar- Kingdom of Saudi Arabia.

Abstract

Aim: Teaching and learning are of vital significance in the development of communities. With the significant advancement in digital communication and technology, e-learning is emerging as an important technique for the process of teaching and learning. This study aimed to analyze the perception about the e-learning among the students at the faculty of medicine, Northern Border University, the Kingdom of Saudi Arabia. Material and Method: The MBBS Students taking pathology courses at the faculty of medicine who were willing to be a participant of the present study had been given: 1. Glass slides of ten common lesions to describe in the class and digital images of the 10 similar lesions were posted on the Electronic Learning System (Blackboard) to answer questions based on them. 2. A self-designed-pre-validated questionnaire based on literature was given to the students. Results: The analysis of the results revealed that the majority of the male and female students enjoyed getting information through e-learning. Most of the male, as well as the female students, found that pathology cases posted on the Electronic Learning System (Blackboard) have enhanced their learning. A large number of students suggested that it would be imperative to learn pathology by studying the lesion images using the light microscope and through Electronic Learning System (Blackboard). A segment of students gave the opinion that they would like to study the pathological lesions from the printed pathology manual instead of learning the pathology material available on the Electronic Learning System (Blackboard). Discussion: The e-learning technique is a quite useful tool for teaching pathology. The students enjoy this tool of learning as it enhances the comprehension of the subject among the students.

Keywords

E-Learning; Learning Management System; Digital Pathology

DOI: 10.4328/ACAM.6117 Received: 10.12.2018 Accepted: 08.01.2019 Published Online: 14.01.2019 Printed: 01.11.2019 Ann Clin Anal Med 2019;10(6): 702-6
Corresponding Author: Syed Sajid Hussain Shah, College of Medicine, Northern Border University, Arar, Kingdom of Saudi Arabia.
T.: 00966537759649 E-Mail: prof.sajid99@gmail.com
ORCID ID: https://orcid.org/0000-0003-3425-6293

Introduction

Innovative teaching methods are essential to address the requirements of students of the twenty-first century [1]. Students view flexibility and self-managed learning as positive [2]. Being able to access information remotely anytime is a major benefit as it includes a reduction in anxiety and an increase in self-efficacy [3].

In order to make the process of teaching and learning more efficient, continuous efforts have been made for the evolvement of new methods for the purpose of improvement in this regard. As the internet became better known, many universities have started to utilize the internet as an additional tool for the learning and teaching purposes [4].

During the period from 1980 to 1989, the computer emerged as a scholarly tutor and the use of multimedia as an educational technology improved the teaching [5]. The technology such as the World Wide Web, intranet, and multi-media-based computer applications may mediate the e-learning [6]. The novel technology is being developed for the improvement in teaching and learning at a fast speed [7]. The interactive discussions with peers in the other parts of a country or even anywhere in the world are possible through e-learning [8].

E-learning is emerging as an alternative system of education around the globe. As a part of tele-education, it has become a very useful educational tool for the professionals associated with health care and particularly for their continued medical education. Previous research has found that many higher educational institutions provide e-learning for the following reasons: 1) E-learning could save resources in the long term; 2) It is a new educational innovation which could improve educational opportunities and quality; 3) E-learning could reduce problems of distance, time, and place.

The present study is conducted with an aim of analyzing perception about the e-learning in the teaching of pathology among the students of the Northern Border University (NBU), Faculty of Medicine.

Material and Method

After getting the approval for the present study from the local committee of Bio-Ethics of our University, the study has been performed by involving the MBBS students taking pathology courses at the Faculty of Medicine. A Simple random sampling technique was employed for the selection of participants. The aims and objectives were discussed and consent was obtained from the participant and their confidentiality has been maintained. A total of 212 students consented to participate in the study, which included 135 female and 77 male students. The study has been conducted during the period of January 2018 to May 2018 in the Faculty of Medicine, Northern border University, Saudi Arabia.

The MBBS Students were given glass slides of ten common lesions to describe the findings in the class and these students were provided with the digital images of the 10 similar lesions on the

Electronic Learning System (Blackboard).

The students were also asked to answer the questions on 10 common clinical cases which were made available on the Electronic Learning System (Blackboard) and traditional case-based learning sessions were conducted for them as well.

A self-designed-pre-validated questionnaire based on literature was given to the students for the evaluation of their perception about learning pathology course through Electronic Learning System (Blackboard) and via traditional way of learning the pathology course.

Practical classes for teaching ten pathological lesions

1. Light microscopic examination of glass slides:

The faculty member from Pathology Department facilitated these practical sessions by demonstrating the histological features of lesions and then students were provided with the box of slide and microscope, to study these glass slides by using light microscope independently.

2. Electronic Learning System (Blackboard) sessions:

The university E-learning system (Blackboard) was used to provide self-paced learning and teaching material in the form of worksheets for the students. The students were allowed to study alone or in small groups. They were asked to submit the answers of the question in the worksheets which were evaluated by the faculty. The data were analyzed using Prism 8 (GraphPad Software Inc., San diego, CA). The p-value <0.05 was considered significant.

Results

A total of 212 medical students participated in this study, which included 135 female medical students and 77 male students. The age varied from 17 to 22 years (20.5 ± 1.3 years). The data analysis revealed that majority of the students have the opinion to use both the glass slides with microscope and images of pathological lesions available on the Electronic Learning System (Blackboard) for better understanding and learning pathology. A significant number of male and female students narrated that learning pathology through Electronic Learning System (Blackboard) has effectively enhanced their learning, boosted their self-confidence, saved their time and resulted in improvement in their examination grades. The majority of female students prefer the study of images available on the Electronic Learning System (Blackboard) over the use of microscope as it helps them to the study the course material at their own convenient time and pace while the majority of male students responded to this question as neutral.

A significant number of female students (14.1% strongly agree & 31.9% agree) are in favor of completely replacing the use of glass slides in pathology with the images by increasing their number on the Electronic Learning System (Blackboard), while only 11.7 % of male students strongly agree with this notion.

The majority of male (29.9% strongly agree and 22.1% agree), as well as female students (28.9 strongly agree and 32.6% agree), have found the use of the Electronic Learning System (Blackboard) for the purposes of this course easy and reliable and they want all the teachers to use the Electronic Learning System (Blackboard) as an e-learning tools in their teaching. The data analysis also revealed that 19.3 % of female students and 13% of female students strongly agreed that by continuously working on Electronic Learning System (Blackboard), they got exhausted. Similarly, a significant portion of students has

Table 1. Analysis of Questionnaire regarding the Perception of medical students of MBBS about e- learning at Northern Border University

Questions	Gender n (%)	Strongly Agree		Agree		Neutral		Disagree		Strongly disagree		Chi- Square p-value X^2
		n	%	n	%	n	%	n	%	n	%	
For the better understanding, it is important to use both, the glass slide on microscope and the images on the E- learning system (Blackboard).	Female 135 (100)	45	33.3	65	48.1	16	11.9	9	6.7	0	0.0	0.0008*** X^2=19.00, 4
	Male 77 (100)	31	40.3	19	24.7	18	23.4	4	5.2	5	6.4	
Reading of the images available on the E- learning system (Blackboard) is easier as compared to the study of glass slides on the microscope.	Female 135 (100)	21	15.6	48	35.6	41	30.4	22	16.2	3	2.2	0.028* X^2=10.80, 4
	Male 77 (100)	21	27.3	20	26.0	30	39.0	5	6.4	1	1.3	
I find the image resolution by adjusting glass slides magnification on microscope better for learning the pathology.	Female 135 (100)	24	17.8	48	35.6	37	27.4	23	17.0	3	2.2	0.0005*** X^2=19.95, 4
	Male 77 (100)	16	20.8	19	24.7	31	40.3	3	3.8	8	10.4	
I find the glass slides quality better than the images quality which has been posted on the blackboard.	Female 135 (100)	41	30.4	33	24.4	29	21.5	32	23.7	0	0.0	0.0006*** X^2=19.56, 4
	Male 77 (100)	11	14.2	17	22.1	30	39.0	13	16.9	6	7.8	
I prefer the study of images available on the E-learning system (Blackboard) over the use of microscope as it helps me to the study the course material at my own convenient time and pace	Female 135 (100)	33	24.4	48	35.6	28	20.7	23	17.0	3	2.3	<0.0001**** X^2=27.92, 4
	Male 77 (100)	9	11.7	12	15.6	38	49.4	12	15.5	6	7.8	
The learning by E- learning system (Blackboard) is effective for my assessments and has helped me in improving my examination results	Female 135 (100)	23	17.0	42	31.1	44	32.7	25	18.5	1	0.7	0.241 X^2=5.485, 4
	Male 77 (100)	15	19.5	16	20.8	31	40.2	13	16.9	2	2.6	
The use of blackboard to learn pathology courses has been very useful to me and it has enhanced my learning.	Female 135 (100)	33	24.4	47	34.9	40	29.6	14	10.4	1	0.7	0.477 X^2=3.504, 4
	Male 77 (100)	17	22.1	24	31.2	28	36.3	6	7.8	2	2.6	
The Images available on the Electronic Learning System (Blackboard) save my time as compared to the study of glass slides on the light microscope	Female 135 (100)	29	21.5	47	34.8	35	25.9	20	14.8	4	3.0	0.0377* X^2=10.17, 4
	Male 77 (100)	28	36.4	17	22.1	23	29.9	9	11.6	0	0.0	
The Images available on the Electronic Learning System (Blackboard) should be increased to completely replace the use of glass slides in pathology.	Female 135 (100)	19	14.1	43	31.9	48	35.5	18	13.3	7	5.2	0.071 X^2=8.630, 4
	Male 77 (100)	9	11.7	12	15.6	36	46.8	15	19.4	5	6.5	
The resolution of images available on the Electronic Learning System (Blackboard) is appropriate for the recognition of organs, tissues, and cells.	Female 135 (100)	35	25.9	57	42.3	35	25.9	7	5.2	1	0.7	0.254 X^2=5.333, 4
	Male 77 (100)	17	22.1	25	32.5	27	35.1	7	9.1	1	1.2	
The study of teaching material on the Electronic Learning System (Blackboard) gives me the chance of learning to work independently.	Female 135 (100)	25	18.5	55	40.8	36	26.7	18	13.3	1	0.7	0.007** X^2=14.08, 4
	Male 77 (100)	12	15.6	29	37.7	34	44.2	2	2.5	0	0.0	
By using the images available on the Electronic Learning System (Blackboard) has been quite fun as compared to the study of glass slides on the microscope.	Female 135 (100)	26	19.3	32	23.7	47	34.8	18	13.3	12	8.9	0.134 X^2=7.035, 4
	Male 77 (100)	8	10.4	12	15.6	34	44.2	14	18.2	9	11.6	
I have found the use of the Electronic Learning System (Blackboard) for the purposes of this course easy and reliable and I want e-learning tools to be used in in the other subjects.	Female 135 (100)	39	28.9	44	32.6	33	24.4	15	11.1	4	3.0	0.048* X^2=9.566, 4
	Male 77 (100)	23	29.9	17	22.1	32	41.5	4	5.2	1	1.3	
I have found that the blackboard-learning is difficult for me as I have no direct contact with the teacher.	Female 135 (100)	31	23.0	44	32.6	49	36.3	10	7.4	1	0.7	0.038* X^2=10.13, 4
	Male 77 (100)	7	9.1	24	31.2	38	49.4	6	7.7	2	2.6	
I have found that continuously working on electronic learning, I got exhausted.	Female 135 (100)	26	19.3	43	31.9	50	37.0	15	11.1	1	0.7	0.185 X^2=6.182, 4
	Male 77 (100)	10	13.0	20	26.0	37	48.1	7	9.1	3	3.8	
I would prefer to study these images on a printed pathology manual instead of viewing these images on the E- learning system (Blackboard).	Female 135 (100)	26	19.3	42	31.1	47	34.8	20	14.8	0	0.0	<0.0001**** X^2=24.60, 4
	Male 77 (100)	10	13.0	11	14.3	37	48.1	8	10.4	11	14.2	

experienced the difficulty due to lack of direct contact with the teacher on e-learning as compared to conventional class teaching. The results are shown in Table 1.

Discussions

The understanding of concepts of pathology is of vital importance for better understanding of the disease process in clinical skill application. For the learning of complex concepts in pathology, additional teaching methodology needs to be employed, which may be helpful in facilitating the learning process.

Since the practical demonstration of pathological lesions requires microscope and glass slides of lesions, which may only be available to students in laboratories during the specified time. Due to the unavailability of the glass slides out of specified hours, a better understanding of these pathological lesions is compromised. The availability of such material on the E-learning system may enhance the learning of the students. E-learning as an educational technique may play an effective role in the improvement of the education. E-learning is a modern tool which is developed with the help of the latest digital techniques and provides interactive learning to the students [9]. It has been documented that E-learning integration in the teaching activities reduces the shortcoming in the process of teaching and learning [10-11]. E-learning is emerging as an alternative technique for the traditional teaching methodologies [12-13].

In the present study, the majority of the male and female students were of the opinion that learning pathology especially case-based studies and understanding images for practical classes through Electronic Learning System (Blackboard) of the University was very useful to them.

In our study, the students agreed that learning pathology course through Electronic Learning System (Blackboard) of the university made them encouraged as they could have frequent access to the resources which helped them in effective learning of the course and has boosted their self-confidence. Similarly, some other series revealed that by using multimedia programs to teach the courses dependent on the usage of images and picture was very useful [14].

Majority of our students have found that understanding the pathology lesion was easy from the images posted on Electronic Learning System (Blackboard) of the university than studying them through the glass slides on a microscope. Findings of our study reflect that students have different viewpoint regarding the advantage and disadvantage of Electronic Learning System (Blackboard) of the university. In our study, many students preferred it, as it has given them their own time and space to learn while others stated that it is difficult for them to understand, as they have no direct contact with the teacher. Earlier studies have shown that E- learning has merits as well as demerits in the teaching process as compared to the traditional teaching [14]. One of the important advantages of E-learning is that the student has access to teaching material round the clock. Our study provides an overview of the students regarding learning pathology through Blackboard management system of the university and how much it can be useful tool for teaching pathology in near future.

The recent advances in diagnostic technology have greatly enhanced the importance of learning aspects of underlying diseases which are being taught on the subject of pathology. The increase in knowledge contents requires more time for teaching them but time limitations are yielding resistance in this regard, which may be overcome by the use of e-Learning.

According to earlier studies, technologies alone may not completely replace the process of teaching and learning which requires physical presence of the teachers [15-17]. In the same way, the faculty must also exhibit interest in novel techniques in teaching strategies. Earlier studies have shown that many faculty members disliked the introduction of newer technologies in their employing universities [18].

Probably in the early stages of introduction to e-learning, there may be some resistance from both faculty and students, which can be attributed to their unfamiliarity with the technology. And later on, when both become more familiar with the E-learning system, they may start enjoying it.

Our study also highlighted the fact that for few students learning pathology course via Blackboard management system of the university was not enjoyable but was rather exhaustive, as continuously working on Blackboard exerted stress on them.

Considering the beneficial effects and also the difficulties expressed by the students in this study, it is recommended that the teaching and learning activities for the students should be both through traditional methods, as well as wherever possible, it should be through Electronic Learning System (Blackboard) of the University.

Conclusion

The E-learning methodology is a very helpful adjunct tool used for teaching and learning in the student-centered educational system but it does not completely eliminate the need of traditional teaching process. By considering the viewpoints of medical students of faculty of medicine, it would be appropriate to conduct the teaching and learning of a part of pathology course through the Electronic Learning System (Blackboard) as an adjunct to the traditional ways of teaching as it would facilitate the comprehension and better understanding of pathology course.

Acknowledgement: The authors are thankful to Amin Khalid HidaytoAllah Makhdoom, Muaz Bilal Abdelhameed Wali, Latifa Yasser Almohaimeed, Atheer Ayad Alenzi and Asmara Syed for data collection and Krishna Kirti Shahi for his technical assistance.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

Funding: This study has been funded by the Deanship of Scientific Research, Northern Border University – Arar , Kingdom of Saudi Arabia.

Conflict of interest

None of the authors received any type of financial support that could be considered potential conflict of interest regarding the manuscript or its submission.

References

1. Adams M. Transformation of nursing education through innovation: To transform nursing education and meet the current and future needs of the clinical environment, innovative methods of teaching and learning are required now. Nursing Education Perspectives. 2014; 35: 275.
2. Kelly M, Lyng C, McGrath M, Cannon G. A multi-method study to determine the effectiveness of, and student attitudes to, online instructional videos for teaching clinical nursing skills. Nurse Education Today. 2009; 29: 292–300.
3. Brannagan K, Delliger A, Thomas J, Mitchell K, Lewis-Trabeaux S, Dupre S. Impact of peer teaching on nursing students: Perceptions of learning environment, self-efficacy, and knowledge. Nurse Education Today. 2013; 33:1440-47.
4. Suanpang P, Petocz P. E-learning in Thailand: An analysis and casestudy. International Journal on ELearning. 2006; 5: 415-38.
5. Farah CS, Maybury T. Implementing digital technology to enhance student learning of pathology. Eur J Dent Educ. 2009; 13: 172-8.
6. Ruiz JG, Mintzer MJ, Leipzig RM. The impact of E-learning in medical education. Acad Med. 2006; 81: 207–12.
7. Kunz R, Nagy E, Coppus SF, Emparanza JI, Hadley J, Kulier R, et al. How far did we get? How far to go? A European survey on postgraduate courses in evidence-based medicine. Journal of Evaluation in Clinical Practice. 2009; 15: 1196-204.
8. Hammoud M, Gruppen L, Erickson SS, Cox SM, Espey E, Goepfert A, et al. To the Point: reviews in medical education online computer assisted instruction materials. American Journal of Obstetrics and Gynecology. 2006; 194: 1064-9.
9. Chou C C. A model of learner-centered computer-mediated interaction for collaborative distance learning. International Journal on E-Learning. 2004; 3: 11-18.
10. Taylor D C M, Hamdy H. Adult learning theories: Implications for learning and teaching in medical education: AMEE Guide No. 83. Medical Teacher. 2013; 35(11). DOI: 10.3109/0142159X.2013.828153.
11. Petit dit Dariel O, Wharrad H, Windle R. Exploring the underlying factors influencing e-learning adoption in nurse education. Journal of Advanced Nursing. 2013; 69: 1289–300.
12. Lahti M, Hätönen H, Välimäki M. Impact of e-learning on nurses' and student nurses knowledge, skills, and satisfaction: A systematic review and metaanalysis. International Journal of Nursing Studies. 2014; 51: 136–49.
13. Tacy J. Northam S. Wieck L. Understanding the effects of technology acceptance in nursing faculty: A hierarchical regression. Online Journal of Nursing Informatics. 2016; 20: 2.
14. Ditmyer MM, Dye J, Guirguis N, Jamison K, Moody M, Mobley CC, et al.Electronic vs. traditional textbook use: dental students' perceptions and study habits. J Dent Educ. 2012; 76: 728-38.
15. Lee S, Barker T, Kumar V. Effectiveness of a learner-directed model for elearning. Journal of Educational Technology & Society. 2016: 19: 221–33.
16. Scoppio G, Covell L. Mapping trends in pedagogical approaches and learning technologies: Perspectives from the Canadian, international, and military education contexts. Canadian Journal of Higher Education. 2016; 46: 127–47.
17. Vītoliņa I. E-inclusion process and societal digital skill development. Discourse & Communication for Sustainable Education. 2015; 6: 86-94.
18. Orlando J. Educational technology: A presupposition of equality? Asia-Pacific Journal of Teacher Education. 2014; 42: 347–62.

How to cite this article:
Agarwal A, Hussain Shah SS. E-learning: a tool for teaching, marking a new era in pathology: A study among the Students in North. Ann Clin Anal Med 2019;10(6): 702-6.